

Nevada Test Site

Gravel Gertie Experiment

March 2001



Sandia National Laboratories conducts its fourth test of the Gravel Gertie concept on November 20, 1982, in Area 5 at the Nevada Test Site.

Introduction

The Gravel Gertie was designed by Mason & Hanger, Silas Mason Co., Inc. The Gravel Gertie consisted of a round room with 2-foot thick concrete walls. For the first three tests in 1957, a staging area was constructed with two staging bays connected to the round room (see an attached diagram).

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Test one used 120 pounds of high explosives and was probably a test of

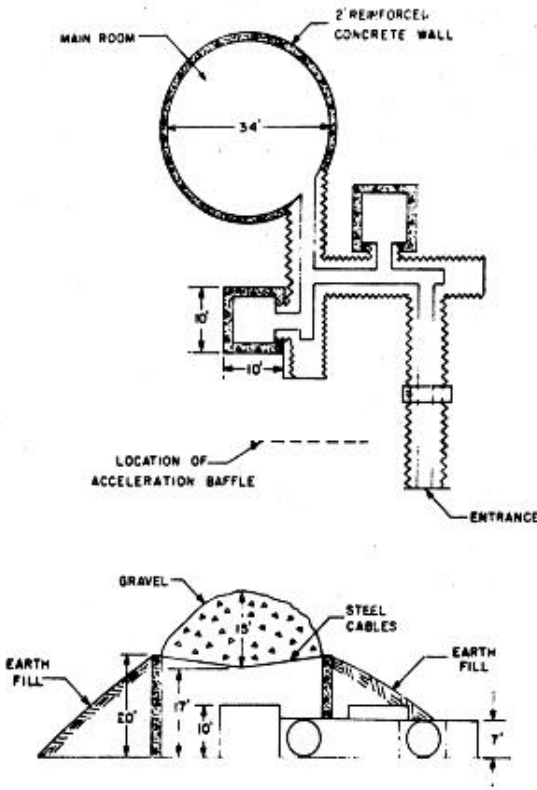


Figure 1. Gravel Gertie structure.

the structure. No tracer was used so no material release data was obtained.

Test two was the first in a series to measure the amount of fallout produced from an explosion inside what is now the standard Gravel Gertie design used at Pantex Plant, Nevada Test Site. Test two had the door open, and test three had the door closed. The detonation of a 550-pound high explosive uranium device generated a uranium oxide aerosol which was the tracer for the experiment. Uranium fallout was measured by means of a large array of fallout trays. Winds before and immediately after the test explosion

were measured by tracking released meteorological balloons. The results indicated that the test produced about a quarter of the fallout that would have been produced had the explosion occurred in the open.

Test three was similar in all respects to test two, except that the entrance to the staging area of the Gravel Gertie was closed with a blast proof door. The high explosive charge was again 550-pounds, with metallic uranium as a substitute tracer for plutonium. Again, the only measurement was uranium fallout by means of fallout trays. After the test it was announced that no "significant amount of radioactive material was released."

By 1962, there was sufficient interest to obtain quantitative measure of the amount of airborne respirable plutonium that would be released from a Gravel Gertie, in case of an accidental explosion.

In 1982, a fourth test was carried out in the same Gravel Gertie structure that was used for the first three tests. The roof was rehung and a staging area was built from a 10-foot diameter metal culvert to mockup the volume of the staging areas for the design of the Pantex Plant.

The test used up to 500 pounds of TNT bonded explosive closely coupled to eight kilograms of metallic uranium as a substitute for plutonium. The concentrations of airborne uranium oxide particles were determined inside the Gravel Gertie just after the explosion. Outside the Gravel Gertie

the concentration of released airborne uranium oxide particles were measured by means of aerosol collectors and analyzers on masts (refer to front page photo) and on an array supported from a balloon. From this data a value for the fraction of the original uranium that would be released in case of an accidental explosion was determined. Post-explosion blast over pressures and gas pressures were measured in the Gravel Gertie at the same time.

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